

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

- 1           1. (Currently amended) A method for detecting a failure sequence or other  
2     undesirable system behavior in a computer system and subsequently taking a  
3     corresponding remedial action, comprising:  
4           receiving instrumentation signals from the computer system while the  
5     computer system is operating;  
6           determining from the instrumentation signals if the computer system is in  
7     a failure sequence that is likely to lead to undesirable system behavior, such as a  
8     system crash, wherein determining if the computer system is in a failure sequence  
9     involves:  
10                     determining correlations between instrumentation signals in  
11                     the computer system, wherein determining the correlations  
12                     involves using a non-linear, non-parametric regression technique to  
13                     determine the correlations, whereby the correlations can  
14                     subsequently be used to generate estimated signals,  
15                     deriving estimated signals for a number of instrumentation  
16                     signals, wherein each estimated signal is derived from correlations  
17                     with other instrumentation signals, and  
18                     comparing an actual signal with an estimated signal for a  
19                     number of instrumentation signal to determine whether the  
20                     computer system is in a failure sequence;

21            wherein the determination involves considering predetermined  
22 multivariate correlations between multiple instrumentation signals and a failure  
23 sequence that is likely to lead to undesirable system behavior; and  
24            if the computer system is in a failure sequence that is likely to lead to  
25 undesirable system behavior, taking a remedial action.

1            2. (Original) The method of claim 1, wherein taking the remedial action  
2 involves generating an alarm.

1            3. (Original) The method of claim 2, wherein generating the alarm  
2 involves communicating the alarm to a system administrator so that the system  
3 administrator can take the remedial action.

1            4. (Original) The method of claim 3, wherein communicating the alarm to  
2 the system administrator involves communicating information specifying the  
3 nature of the failure sequence to the system administrator.

1            5. (Original) The method of claim 1, wherein taking the remedial action  
2 can involve: killing processes, blocking creation of new processes, or throwing  
3 away work, until the system is no longer in a failure sequence that is likely to lead  
4 to undesirable system behavior.

1            6 (Canceled).

1            7. (Currently amended) The method of claim 1-~~claim 6~~, wherein  
2 comparing an actual signal with an estimated signal involves using sequential  
3 detection methods to detect changes in a relationship between the actual signal  
4 and the estimated signal.

1           8. (Original) The method of claim 7, wherein the sequential detection  
2 methods include the Sequential Probability Ratio Test (SPRT).

1           9 (Canceled).

1           10. (Currently amended) The method of claim 1-~~claim 9~~, wherein  
2 determining the correlations involves:  
3           deliberately overloading the computer system during a test mode to  
4 produce undesirable system behavior, such as a system crash; and  
5           identifying multivariate correlations between multiple instrumentation  
6 signals and the system crash.

1           11 (Canceled).

1           12. (Currently amended) The method of claim 1-~~claim 11~~, wherein the  
2 non-linear, non-parametric regression technique can include a multivariate state  
3 estimation technique.

1           13. (Original) The method of claim 1, wherein the instrumentation signals  
2 can include:  
3           signals associated with internal performance parameters maintained by  
4 software within the computer system;  
5           signals associated with physical performance parameters measured  
6 through sensors the computer system; and  
7           signals associated with canary performance parameters for synthetic user  
8 transactions, which are periodically generated for performance measuring  
9 purposes.

1           14. (Currently amended) A computer-readable storage medium storing  
2 instructions that when executed by a computer cause the computer to perform a  
3 method for detecting a failure sequence or other undesirable system behavior in a  
4 computer system and subsequently taking a corresponding remedial action,  
5 wherein the computer-readable storage medium includes magnetic and optical  
6 storage devices, disk drives, magnetic tape, CDs (compact discs), and DVDs  
7 (digital versatile discs or digital video discs), the method comprising:  
8           receiving instrumentation signals from the computer system while the  
9 computer system is operating;  
10           determining from the instrumentation signals if the computer system is in  
11 a failure sequence that is likely to lead to undesirable system behavior, such as a  
12 system crash, wherein determining if the computer system is in a failure sequence  
13 involves:  
14                     determining correlations between instrumentation signals in  
15                     the computer system, wherein determining the correlations  
16                     involves using a non-linear, non-parametric regression technique to  
17                     determine the correlations, whereby the correlations can  
18                     subsequently be used to generate estimated signals,  
19                     deriving estimated signals for a number of instrumentation  
20                     signals, wherein each estimated signal is derived from correlations  
21                     with other instrumentation signals, and  
22                     comparing an actual signal with an estimated signal for a  
23                     number of instrumentation signal to determine whether the  
24                     computer system is in a failure sequence;  
25           wherein the determination involves considering predetermined  
26 multivariate correlations between multiple instrumentation signals and a failure  
27 sequence that is likely to lead to undesirable system behavior; and

28           if the computer system is in a failure sequence that is likely to lead to  
29   undesirable system behavior, taking a remedial action.

1           15. (Original) The computer-readable storage medium of claim 14,  
2   wherein taking the remedial action involves generating an alarm.

1           16. (Original) The computer-readable storage medium of claim 15,  
2   wherein generating the alarm involves communicating the alarm to a system  
3   administrator so that the system administrator can take the remedial action.

1           17. (Original) The computer-readable storage medium of claim 16,  
2   wherein communicating the alarm to the system administrator involves  
3   communicating information specifying the nature of the failure sequence to the  
4   system administrator.

1           18. (Currently amended) The computer-readable storage medium of claim  
2   14-claim 16, wherein taking the remedial action can involve: killing processes,  
3   blocking creation of new processes, or throwing away work, until the system is no  
4   longer in a failure sequence that is likely to lead to undesirable system behavior.

1           19 (Canceled).

1           20. (Currently amended) The computer-readable storage medium of claim  
2   14-claim 19, wherein comparing an actual signal with an estimated signal involves  
3   using sequential detection methods to detect changes in a relationship between the  
4   actual signal and the estimated signal.

1           21. (Original) The computer-readable storage medium of claim 20,  
2 wherein the sequential detection methods include the Sequential Probability Ratio  
3 Test (SPRT).

1           22 (Canceled).

1           23. (Currently amended) The computer-readable storage medium of claim  
2 14-claim 22, wherein determining the correlations involves:  
3           deliberately overloading the computer system during a test mode to  
4 produce undesirable system behavior, such as a system crash; and  
5           identifying multivariate correlations between multiple instrumentation  
6 signals and the system crash.

1           24 (Canceled).

1           25. (Currently amended) The computer-readable storage medium of claim  
2 14-claim 24, wherein the non-linear, non-parametric regression technique can  
3 include a multivariate state estimation technique.

1           26. (Original) The computer-readable storage medium of claim 14,  
2 wherein the instrumentation signals can include:  
3           signals associated with internal performance parameters maintained by  
4 software within the computer system;  
5           signals associated with physical performance parameters measured  
6 through sensors the computer system; and  
7           signals associated with canary performance parameters for synthetic user  
8 transactions, which are periodically generated for performance measuring  
9 purposes.

1 | 2827. (Currently amended) An apparatus that detects a failure sequence or  
2 | other undesirable system behavior in a computer system and subsequently takes a  
3 | corresponding remedial action, comprising:

4 | a monitoring mechanism configured to monitor instrumentation signals  
5 | from the computer system while the computer system is operating;

6 | a determination mechanism configured to determine from the  
7 | instrumentation signals if the computer system is in a failure sequence that is  
8 | likely to lead to undesirable system behavior, such as a system crash, wherein  
9 | determining if the computer system is in a failure sequence involves:

10 | determining correlations between instrumentation signals in  
11 | the computer system, wherein determining the correlations  
12 | involves using a non-linear, non-parametric regression technique to  
13 | determine the correlations, whereby the correlations can  
14 | subsequently be used to generate estimated signals,

15 | deriving estimated signals for a number of instrumentation  
16 | signals, wherein each estimated signal is derived from correlations  
17 | with other instrumentation signals, and

18 | comparing an actual signal with an estimated signal for a  
19 | number of instrumentation signal to determine whether the  
20 | computer system is in a failure sequence;

21 | wherein the determination mechanism is based on multivariate  
22 | correlations between multiple instrumentation signals and a failure sequence that  
23 | is likely to lead to undesirable system behavior; and

24 | a remediation mechanism that is configured to take a remedial action if the  
25 | computer system is in a failure sequence that is likely to lead to undesirable  
26 | system behavior.